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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/588,549	04/13/2007	Masahide Matsuura	294551US0PCT	8443

22850 7590 11/10/2009

OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
YANG, JAY	
ART UNIT	PAPER NUMBER
1794	

NOTIFICATION DATE	DELIVERY MODE
11/10/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary	Application No.	Applicant(s)	
	10/588,549	MATSUURA ET AL.	
	Examiner	Art Unit	
	JACK YANG	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *13 August 2009; 15 September 2008; 05 January 2007; 07 August 2006*
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

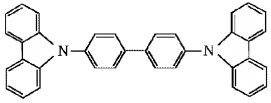
Claim Rejections – 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 7, and 14, are rejected under 35 U.S.C. 102(b) as being anticipated by Tsuboyama et al. (JP 2002-343572 A) as evidenced by Thoms et al. (JP 2003-317966 A), Tsuboyama et al. 2 (US 6,783,873 B2), and Mishima et al. (US 2002/0096995 A1).

Regarding Claims 1 and 7, Tsuboyama et al. discloses an organic EL device comprising a cathode (11), an electron-transporting layer (16), a light-emitting layer (12a), a hole-transporting layer (13), an anode (14), and a substrate (15) in that order (Drawing 1). Tsuboyama et al. discloses the use of CBP as host material for the light-emitting layer and $Ir(ppy)_3$, a phosphorescent metal complex, as the light-emitting dopant ([0104]). Tsuboyama et al. discloses the use of Alq_3 as material for the electron-transporting layer ([0113]). This would result in the triplet energy gap of the CBP host material of the light-emitting layer = 2.67-2.81 eV as evidenced by Thoms et al. (Table 1). The structure of CBP is shown below:



Regarding Claims 2 and 14, The triplet energy gap of $Ir(ppy)_3$ = 2.4 eV as evidenced by Tsuboyama et al. 2 (col. 7, lines 50-52) while the triplet energy gap and ionization potential of Alq_3 = 2.51 and 5.8 eV, respectively, as evidenced by Mishima et al. (Table 2, page 13). This would result in an organic EL device in which the triplet energy gap of the electron-transporting material > triplet energy gap of the metal complex compound of the light-emitting layer.

Claim Rejections – 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

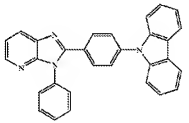
2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 3-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuboyama et al. (JP 2002-343572 A) in view of Mishima et al. (US 2002/0096995 A1).

Tsuboyama et al. discloses the organic EL device according to Claim 1 as shown above in the 35 U.S.C. 102(b) rejection. Tsuboyama et al. discloses a variety of compounds as electron-transporting material including Alq_3 ([0009]) and oxadiazole derivatives ([0013]). However, Tsuboyama et al. does not disclose an electron-transporting material comprising a carbazolyl group.

Mishima et al. discloses the following electron-transporting compound:

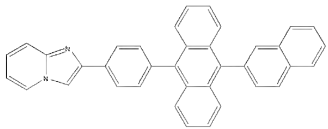


((10), page 6). It would have obvious to one of ordinary skill in the art at the time of the invention to incorporate the above electron-transporting compound containing a carbazolyl group and a nitrogen-containing 5-membered ring (fused imidazole group) as disclosed by Mishima et al. to the electron-transporting layer of the organic EL device as disclosed by Tsuboyama et al. The motivation is provided by the fact that Tsuboyama et al. already discloses a wide range of nitrogen-containing compounds to be used as electron-transporting material as described above, and the compound can generate excitons with high efficiency ([0074]).

4. Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuboyama et al. (JP 2002-343572 A) in view of Shi et al. (US 5,817,431 A) and Ikeda et al. (JP 2004-002297 A) as evidenced by Hamada et al. (US 6,921,590 B2).

Regarding Claim 9, Tsuboyama et al. discloses the organic EL device according to Claim 1 as shown above in the 35 U.S.C. 102(b) rejection with CBP as host material in the light-emitting layer. The Ip of CBP = 5.9 eV as evidenced by Hamada et al. (col. 7, line 61). Tsuboyama et al. discloses a variety of compounds as electron-transporting material including Alq_3 ([0009]) and oxadiazole derivatives ([0013]). However, Tsuboyama et al. does not specifically disclose an electron-transporting material such that the I_p difference between the electron-transporting material and the host material of the light-emitting layer is between -0.2-0.4 eV. Tsuboyama et al. also does not disclose an organic EL device comprising a plurality of electron-transporting layers.

Ikeda et al. discloses the following compound as electron-transporting material for an organic EL device:



(9, Table 28, [0054]) which has I_p = 5.7 eV, E_g = 3.0 eV, and E_g^T = 2.80 eV as disclosed in the present specification (Table 1, page 37). It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the above electron-transporting compound for Alq_3 in the electron-transporting layer of the organic EL device as disclosed by Tsuboyama et al. The motivation is provided by the fact that Tsuboyama et al. discloses a wide variety of nitrogen containing electron-transporting material in the electron-transporting layer ([0009] and [0013]), in addition to the fact that

the compound disclosed by Ikeda et al. assists in increasing luminous efficiency and long-term stabilization of an organic EL device ([0001]), such that the substitution is predictable with a reasonable expectation of success. This would result in the difference in $I_p = I_p$(compound disclosed by Ikeda et al.) – I_p(CBP) = 5.7 - 5.9 eV = -0.2 eV.

Regarding Claims 10-13, Shi et al. discloses an organic EL device with an electron-injecting layer (24) between an electron-transporting layer (22) and the cathode (26). Shi et al. discloses the use of Alq_3 as material for the electron-injecting layer (col. 2, lines 14-17). This would inherently make the electron-injecting layer additionally an electron-transporting layer due to the electron-transporting properties of Alq_3. It would have been obvious to one of ordinary skill in the art to incorporate an additional layer – the electron-injecting layer comprising Alq_3 – to the organic EL device as disclosed by Tsuboyama et al. in view of Ikeda et al. (such that the electron-transporting layer comprising Alq_3 lies on top of another electron-transporting layer comprising the nitrogen-containing anthracene compound as disclosed by Ikeda et al. as shown above that is adjacent and closer to the light-emitting layer). The motivation would be the fact that the use of electron-injecting layers to increase electron-injection to the light-emitting layer in an organic EL device is widely known in the art.

Because the I_p = 5.7 eV, E_g = 2.7 eV, and E_g^T = < 2.7 eV of Alq_3 as disclosed in the present specification (Table 1, page 37) and the I_p = 5.7 eV, E_g = 3.0 eV, and E_g^T = 2.80 eV as disclosed in the present specification (Table 1, page 37) of the nitrogen-containing anthracene comopund as disclosed by Ikeda et al. as shown above, this

would result in the difference in I_p of adjacent electron-transporting materials forming two adjacent layers = 5.7 - 5.7 eV = 0. This would also result in the E_g/E_g^T of the material forming the electron-transporting layer (Alq_3) < E_g/E_g^T of the material forming the adjacent electron-transporting layer nearer to the light-emitting layer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JACK YANG whose telephone number is (571)270-1137. The examiner can normally be reached on Monday to Thursday from 8:30 am to 6:00 pm Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1794

/J. Y./
Examiner, Art Unit 1794